



CGI Climate Change and Sustainability conference

Joanne Kwan, Senior Research Manager, Contaminated Land
Programme Lead, CIRIA

21 Oct 2022



How prepared we were?



The hottest temperatures are expected on Monday and Tuesday, with highs of 40°C possible.

A Level 4 alert has been issued for the first time since the [Heatwave Plan for England](#) was introduced in 2004.

Top tips for staying safe in hot weather include:

- look out for those who may struggle to keep themselves cool and hydrated
 - older people, those with underlying conditions and those who live alone are particularly at risk
- stay cool indoors by closing curtains on rooms that face the sun – and remember that it may be cooler outdoors than indoors
- drink plenty of fluids and avoid excess alcohol
- never leave anyone in a closed, parked vehicle, especially infants, young children or animals
- check that fridges, freezers and fans are working properly
- try to keep out of the sun between 11am to 3pm, when the UV rays are strongest
- walk in the shade, apply sunscreen and wear a wide-brimmed hat, if you have to go out in the heat
- avoid physical exertion in the hottest parts of the day
- make sure you take water with you if you are travelling
- take care and make sure to [follow local safety advice](#) if you are going into the water to cool down

NEWS

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London wildfires: Firefighters felt like they were in warzone

By Jennifer McKiernan
BBC News
5 days ago

UK heatwaves



Tackling the wildfires at the heart of London's major incident felt like being in a warzone, a fire boss has said.

Soho station commander John Singleton co-ordinated the response to the fire in Wennington, east London, on Tuesday which destroyed 14 homes.

Comparing the situation to the Blitz, he said it was "probably one of the worst days" in his 22-year career.

The heatwave sparked the biggest response since World War Two. He said colleagues could not have done more.

With temperatures topping 40C, emergency services declared the major incident due to the scale of fires in the capital and beyond.

London Fire Brigade (LFB) dealt with 1,146 incidents in 24 hours, Mr Singleton said, stretching resources to the limit.



The Climate Emergency

'Business as usual' is no longer an option

UK Weather – Is it changing? And is it climate change?

Changes to the UK climate and weather events

	Changes in intensity or frequency so far	Is this linked to climate change?	What is expected in the future?
UK warm spells	Increase	Yes	Increase
UK cold spells	Decrease	Yes	Decrease
UK heavy rain	Increase	Inconclusive	Increase
UK dry spells	No trend detected	Inconclusive	Increase (summer)
UK wind storms	No trend detected	Inconclusive	Increase*

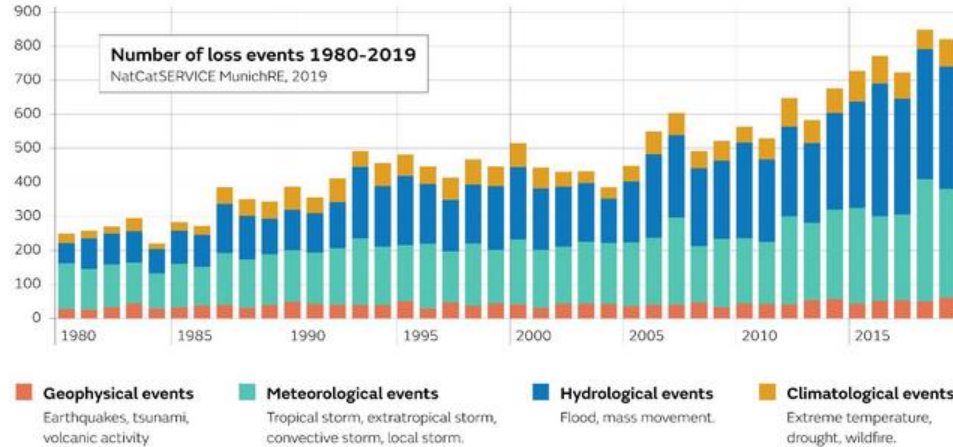
<https://www.metoffice.gov.uk/weather/climate-change/effects-of-climate-change>

In the future, the Met Office projects that the UK will see:

- Warmer and wetter winters
- Hotter and drier summers
- More frequent and intense weather extremes

Loss events are more frequent

 **Met Office** Are extremes becoming more frequent?



This graph from [Munich RE](https://www.metoffice.gov.uk/weather/climate/climate-and-extreme-weather) shows events causing loss are becoming more frequent.

<https://www.metoffice.gov.uk/weather/climate/climate-and-extreme-weather>

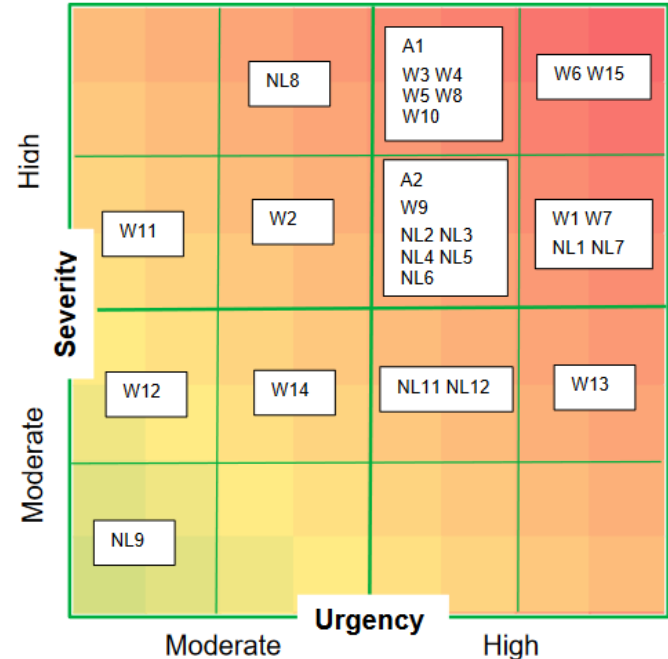
EA Heat Mapping showing urgency and severity of climate risks

Risks to EA2025 aim for rivers, lakes, groundwater and coasts:

- W6: Water pollution/ contamination due to flooding
- W7: Decline in water quality due to reduced dilution
- W8: Increased eutrophication due to warmer water
- W9: Remobilisation of contaminants due to warmer water
- W10: Saline intrusion

Risks to EA2025 aim on protecting nature and land

- NL2: Land contamination due to mobilisation of contaminants
- NL3: Reduced infiltration due to drier periods
- NL4: Altered geomorphological processes due to wetter periods
- NL9: Landfill caps drying out and losing integrity during heatwaves



Remember this from 2010 ?



“Risks from contamination that are acceptable now might not be in the future – you need to factor climate change into your risk assessments.”



What does LCRM say about climate change?



Home > Environmental planning > Land contamination risk management (LCRM)



Guidance

LCRM: Before you start

Updated 19 April 2021

Sustainability

We support a sustainable approach to land contamination risk management.

The industry-led Sustainable Remediation Forum UK (SuRF-UK) has produced a [framework for assessing the sustainability of soil and groundwater remediation](#).

This framework complements LCRM's risk based approach and we support its use.

It sets out why sustainability issues associated with remediation need to be factored in from the start of a project through to completion.

You can use the framework and supporting materials to help you to:

- identify at an early stage how you can embed sustainability at a number of key points in a site's redevelopment or risk management process
- make sure the process balances the environmental, social and economic impacts and generates maximum overall benefit
- factor in **climate** change to ensure site works and any long term remediation is sustainably robust

What does LCRM say about climate change?

Home > Environmental planning > Land contamination risk management (LCRM)



Guidance

LCRM: Stage 1 risk assessment

Updated 19 April 2021

Consider sustainability

From the outset you can consider sustainability. For example, you can use the [Sustainable Management Practices \(SMPs\)](#) from Sustainable Remediation Forum UK (SuRF-UK) on the CL:AIRE website. This can help you to identify options to minimise the environmental, social and economic impact of the risk assessment stage.

You can also consider how **climate** change might impact your site.

Take this into account in your risk assessment and for any site investigation.

Decide what information you need for generic quantitative risk assessment

You may also need further information on other site conditions such as:

- any previous investigation or remediation already done
- weather and natural patterns – such as seasonal variations in water levels, tidal impacts and potential for or evidence of previous flooding, **climate** change implications
- presence of structures and buried services

What does LCRM say about climate change?



Home > [Environmental planning](#) > [Land contamination risk management \(LCRM\)](#)



Guidance

LCRM: Stage 2 options appraisal

Updated 19 April 2021

Options appraisal management objectives

Use management objectives to define the required remediation outcome. For example to:

- consider and factor in any regulatory controls that you may need to meet such as the treatment being acceptable
- achieve sustainable remediation considering any reasonable **climate** change issues

Environmental impact

Consider the effect that the remediation will have on the quality of the environment during and after it is complete.

Include this in the evaluation if you are not doing a separate sustainability assessment. Otherwise you can assess it as part of your sustainability assessment. Also take **climate** change issues into account.

Sustainability

To consider sustainability you can use [Stage B of the SuRF-UK Framework](#). You can use this to differentiate the remediation options against environmental, social and economic indicators taking into account any relevant **climate** change issues.

You can also use BS ISO 18504: [Soil quality. Sustainable remediation](#).

What does LCRM say about climate change?

[Home](#) > [Environmental planning](#) > [Land contamination risk management \(LCRM\)](#)



Guidance

LCRM: Stage 3 remediation and verification

Updated 19 April 2021

Sustainable remediation

It is important to consider a sustainable approach to remediation.

Remediation has the potential to cause environmental, economic and social impacts. You can demonstrate how you have addressed this by showing:

- the benefit of doing remediation is greater than its impact
- you have used a balanced decision making process to select the optimum remediation solution

The remediation can also have adverse effects on **climate** change if it is not done correctly. If you select a poor remediation design and implementation, the activities may cause greater adverse effect than the contamination it aims to address.

Sustainable remediationnot just climate mitigation!

- Elimination and/or **control of unacceptable risks** in a safe and timely manner whilst optimising the environmental, social and economic value of the work

(BS ISO 18504:2017)

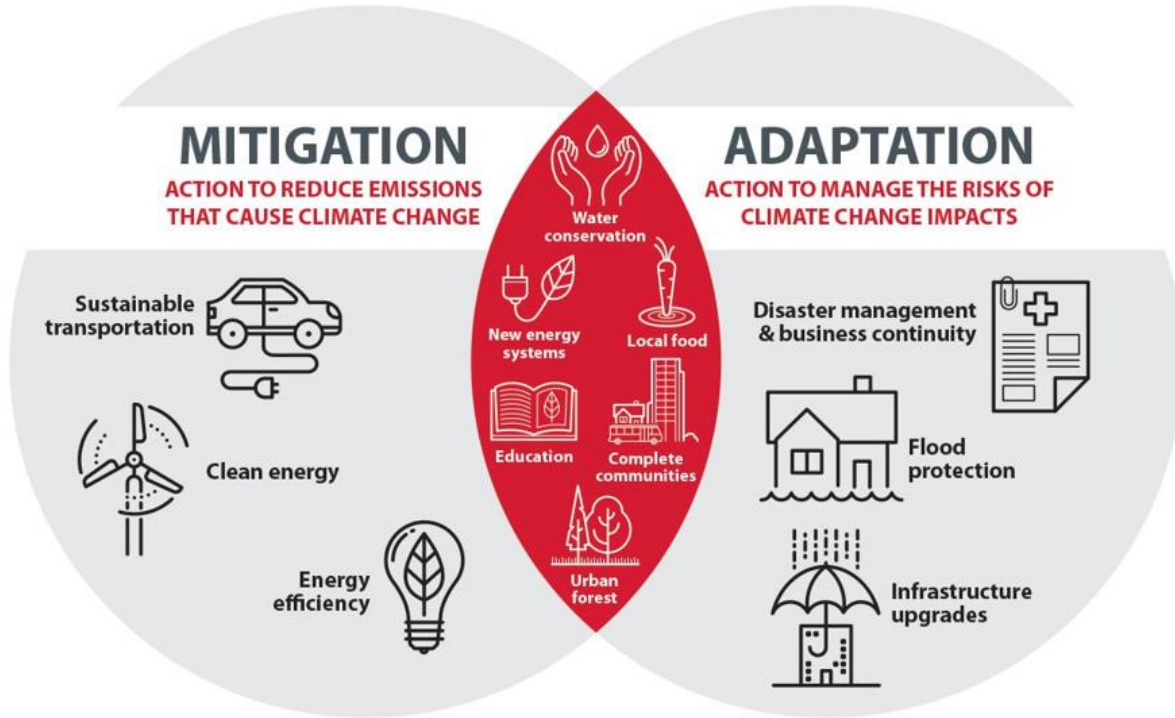
- ‘the practice of demonstrating, in terms of environmental, economic and social indicators, that **the benefit of undertaking remediation is greater than its impact** and that the optimum remediation solution is selected through the use of a balanced decision making process.’

(SURF- UK Framework 2010)

SURF UK - Key Principles of Sustainable Remediation

1. Protection of human health and the wider environment
2. Safe working practices
3. Consistent, clear and reproducible evidence-based decision making
4. Record keeping and transparent reporting
5. Good Governance and stakeholder involvement
6. **Sound Science**

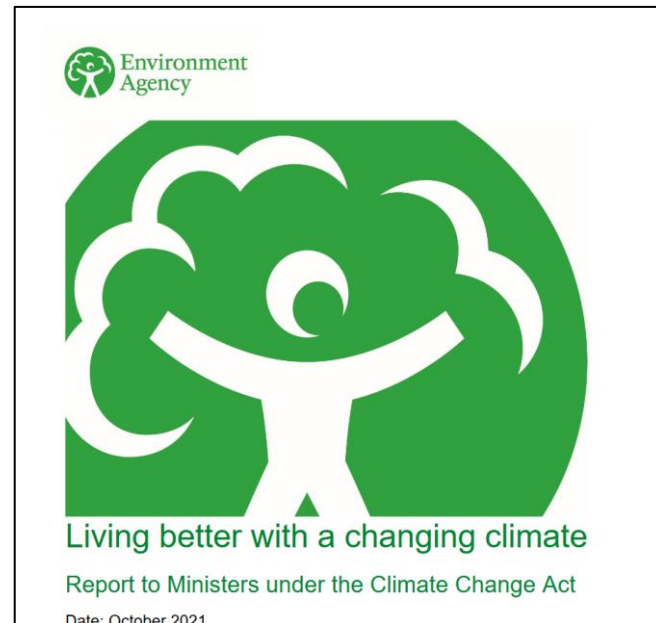
Building Climate Resilience



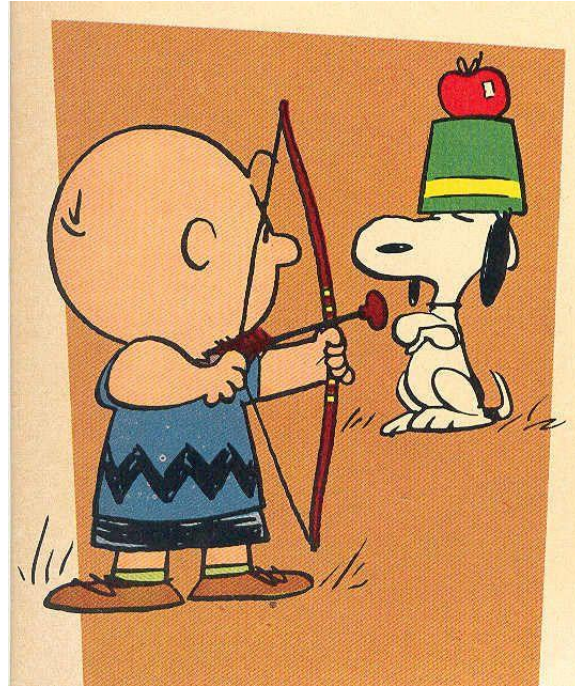
EA's main actions to support their detailed Climate Change Adaption Plan



- Deliver the national flood and coastal erosion risk management strategy.
- Tackle pressures on England's water environment
- Improve the resilience of wildlife species and ecosystems
- Manage (environmental) climate risks to and from regulated industry
- Prepare for bigger, more frequent and complex environmental incidents
- Reduce our corporate climate footprint and climate risks



Guidance.... how I feel....



CIRIA climate change and contaminated land interested group

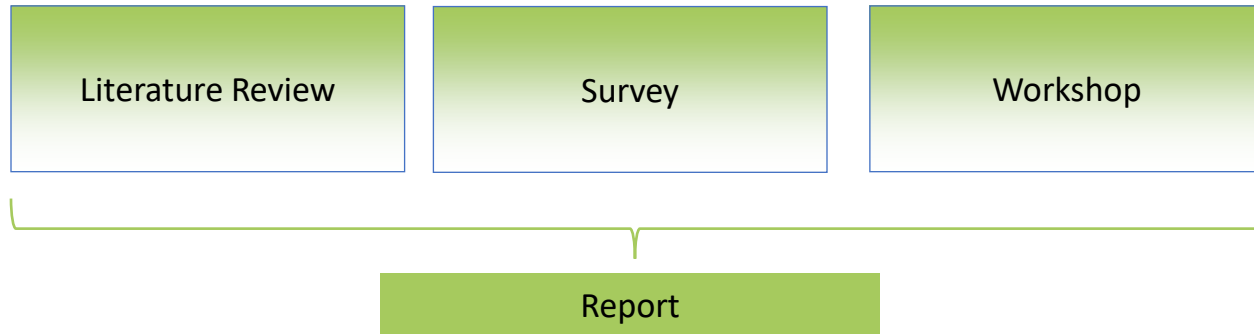


- Lead by CIRIA since 2018
- Delivered about 5 meetings/events
- Variable interest



EA Project: Climate change effect on land contamination – literature review and consultation March 2022

- To help improve EA's understanding of climate change effects on land contamination by critically evaluating the state of knowledge of the effects of England's changing climate on remedial activities
- For specific groups of chemicals (i.e. POP (PCBs, brominated flame retardants, PFAS), Mercury, asbestos and VOCs) in soil and controlled waters



Key climate change concerns in contaminated land projects

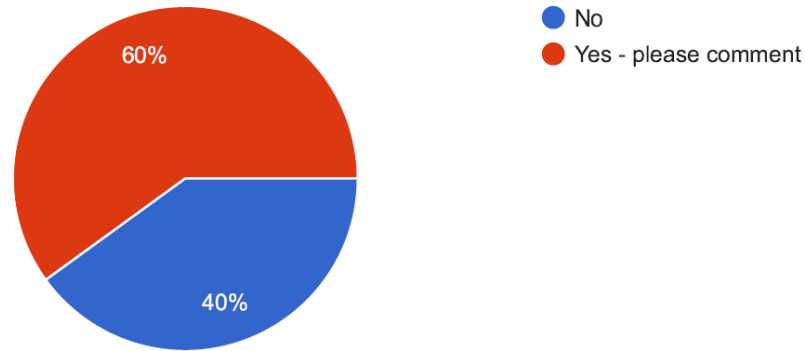
ANSWER CHOICES	RESPONSES	
Warmer winters (between 1 and 4.5°C warmer)	17.11%	13
Wetter winters (up to 30% wetter)	69.74%	53
Hotter summers (1 and 6°C warmer)	25.00%	19
Drier summers (depending on region up to 60%)	40.79%	31
Increases in the intensity of rainfall (up to 20% in summer and 25% in winter)	80.26%	61
Days when rainfall exceeds 30mm per hour (the Met office flash flood alert threshold) are twice as likely	61.84%	47
Windier	18.42%	14
I don't have any concerns	1.32%	1
Other (please specify)	17.11%	13
Total Respondents: 76		

Note: Figures taken Climate change in the UK - Met Office 2070 projections

Industry experiences and considerations

Have your brownfield projects ever considered climate change risk?

35 responses



Recommendations



- We need to raise industry and other regulators' awareness of the effects of EWE on contaminated land in planning, water resource protection and Part 2A context.
- LCRM expects climate change to be considered so that site works and any long-term remediation are sustainably robust. LCRM could signpost:
 - detailed guidance on how to consider EWE impacts on the conceptual site model during the risk assessment, options appraisal and remediation stages.
 - guidance on sensitivity analysis to constrain the impacts on remediation design of different rates of infiltration, fluctuating groundwater levels, predicted groundwater temperatures in shallow aquifers – all over periods relevant to the anticipated lifespan of the remediation approach being designed.
 - specific reference to mercury and PFAS in the options appraisal spreadsheet

Recommendations

- Monitor effects of year-on-year climate change by harvesting, curating and making available already collected environmental data
- Establish the long-term resilience of cover systems
- Understand the current range of shallow aquifer temperatures and what would be reasonable future predictions.
- Encourage development of tools that incorporate the effects of climate change on land contamination projects.
- Encourage empirical and theoretical research on the effects of rainfall intensity on susceptible remediation approaches such as capping and stabilisation.

Recommendations to plug substance specific gaps in knowledge



PCBs

Effect of warmer and wetter weather on fate and transport of PCBs in the presence of small amounts of non-polar solvents

BFR

We need to understand how different behaviours of five groups of BFR compounds in the environment could limit potential degradation options

PFAS

- chemical and physical properties of all types of PFAS
- influence of climate change and EWE in soil and groundwater chemistry and how this affects the forms, fate and transport of the PFAS
- exposure pathways of soil, plants, animals and groundwater
- long-term performance of pathway interruption techniques including capping and stabilisation

Recommendations to plug substance specific gaps in knowledge



VOC

- how lag time and level of temperature change in shallow soils during extreme heat or cold
- effects of changes in soil moisture in the vicinity of the top of the saturated/base of the unsaturated zones on natural biochemical processes of VOCs

Mercury

- effects of changing soil chemistry (e.g. acidification, loss of organic matter, desiccation) due to EWE on the form of mercury
- effects of changes in soil moisture in the vicinity of the top of the saturated/base of the unsaturated zones on natural biochemical processes are poorly constrained and rarely studied as part of a site investigation

Asbestos

More good UK data on background asbestos in air

Gaps in industry knowledge and experience identified from CIRIA/EA project survey



- What time periods and climate change predictions should be used for assessing climate change in land contamination risk assessments and designing climate resilience
- understanding how to take account of climate change in risk assessment and remediation design. Specifically, the industry is seeking, reports/evidence to help understand the impacts of changing climate on contaminated land projects and practical guidance on how to manage these impacts
- consistency across local authorities, the lead land contamination regulator, on how climate change and EWE should be managed in land contamination projects they are regulating or consulting on under the planning regime

SOBRA report Guidance on Assessing Risk to Controlled Waters from UK Land Contamination Under Conditions of Future Climate Change August 2022



- How the varying effects (e.g. changes in soil moisture content or short-term oversaturation of soils) associated with a changing climate (e.g. protracted dry periods or extreme rainfall events) could be incorporated into conceptual site modelling and the implications of this to the Source-Pathway-Receptor linkage.
- Identifying the key model parameters that may be affected by climate change for use **in controlled waters** detailed quantitative risk assessment (DQRA).
- Signposting towards useful data sources to aid the consideration of climate change in risk assessments

First findings...

No mention of climate change as part of site investigation and remediation under Part 2A.

But BS EN ISO 21365: 2020 said

Once, developed, a CSM should comprise all relevant information, including: ...

— **foreseeable events** [which could affect contaminant impacts or create new exposure pathways] [e.g. ... extreme weather conditions etc.]

The SOBRA report



- Once the preliminary CSM has been developed, climate change should be incorporated by re-evaluating the potential SPR linkage assessment.
- Use quantitative data to re-address the generic quantitative risk assessment for medium to long term climate change effects.

Modelling



- Standard commercially available simulation models in the UK for to controlled waters from land contamination tools are **ill-equipped** to model temporal changes
- Modelling for specific time periods such as the near-term, the 2050s, and the 2080s, and the model results then combined to allow assessment, **even if temporally coarse, of how risk changes into the future.**
- Considering potential changes to source dimensions, source concentrations, pathway lengths, and receptor designations
- Considering the values of the following four parameters under conditions or consequences
 - Recharge
 - Groundwater elevation (and thereby unsaturated and saturated zone thicknesses)
 - Hydraulic gradient
 - Surface water flow.
- Considering projected low river flow data when undertaking a Level 4 assessment comprising dilution within the receiving surface water body.

What else are missing... these will be included in the CIRIA new guidance!



- What about soil?
- Source removal versus pathway interruption e.g. durability of cover systems
- How the new design, construction, and maintenance of remediation approaches could be changed to accommodate EWE?
- How existing remediation e.g. monitored natural attenuation will be affected EWE
- Case studies



- Which part of the RA needs updating?
- Will different contaminants be different?
- What sort of data do we need?
- What sort of products/services are needed?

Thank you for listening



Joanne Kwan

joanne.kwan@ciria.org